ABSTRACT OF THE DISCLSOURE

A dispensing device has a cantilever comprising a plurality of thin films arranged relative to one another to define a microchannel in the cantilever and to define at least portions of a dispensing microtip proximate an end of the cantilever and communicated to the microchannel to receive material therefrom. The microchannel is communicated to a reservoir that supplies material to the microchannel. One or more reservoir-fed cantilevers may be formed on a semiconductor chip substrate. A sealing layer preferably is disposed on one of the first and second thin films and overlies outermost edges of the first and second thin films to seal the outermost edges against material leakage. Each cantilever includes an actuator, such as for example a piezoelectric actuator, to impart bending motion thereto. The microtip includes a pointed pyramidal or conical shaped microtip body and an annular shell spaced about the pointed microtip body to define a material-dispensing annulus thereabout. The working microtip may be used to dispense material onto a substrate, to probe a surface in scanning probe microscopy, to apply an electrical stimulus or record an electrical response on a surface in the presence of a local environment created around the tip by the material dispensed from the tip or to achieve other functions.